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(54) Title: **MAGNETIC NANOTUBES**

(57) Abstract: A magnetic nanotube includes bacterial magnetic nanocrystals contacted onto a nanotube which absorbs the nanocrystals. The nanocrystals are contacted on at least one surface of the nanotube. A method of fabricating a magnetic nanotube includes synthesizing the bacterial magnetic nanocrystals, which have an outer layer of proteins. A nanotube provided is capable of absorbing the nanocrystals and contacting the nanotube with the nanocrystals. The nanotube is preferably a peptide bolaamphiphile. A nanotube solution and a nanocrystal solution including a buffer and a concentration of nanocrystals are mixed. The concentration of nanocrystals is optimized, resulting in a nanocrystal to nanotube ratio for which bacterial magnetic nanocrystals are immobilized on at least one surface of the nanotubes. The ratio controls whether the nanocrystals bind only to the interior or to the exterior surfaces of the nanotubes. Uses include cell manipulation and separation, biological assay, enzyme recovery, and biosensors.

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